# Generalization of the Mixture Model Using a Copula Function

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In the mixture distribution model (for continuous and discrete cases), the density function, $\tilde{f}(t)$ is given by a linear combination of $k$ density functions, $f_i(t)$, $i = 1, \cdots, k$, with non-negative weights $p_i$ which must sum to 1.0. We propose a generalization of the mixture model where the weights are not restricted to being constant. The specification of the weight functions is not easy because $\tilde{f}(t)$ must be integrated to one. This is done by defining a random variable which has a density with the desired form. The definition of the random variable includes random variables with the densities $f_i(t)$ and a copula function. The proposed model includes the traditional mixture model, the polyhazard and the fraction of cure models. Real applications are used to illustrate the model.

**Key Words:** Distribution functions, generalized probability distributions, multimodal hazard functions